

WHAT IS CLAIMED IS:

1. A compound of the formula (I):

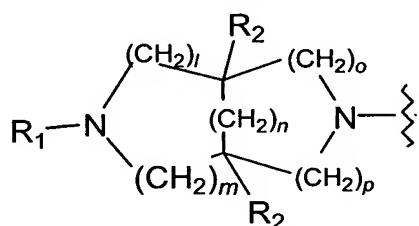
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(I)

or a pharmaceutically acceptable salt, ester, amide, or prodrug thereof, wherein:

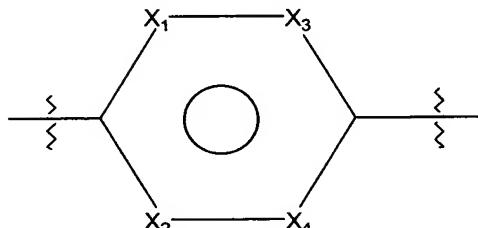
Z is a diazabicyclic amine of the formula:



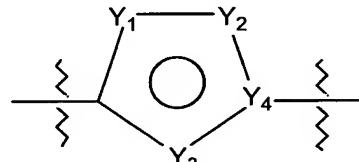
(II)

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Ar₁ is a 5- or 6-membered aromatic ring of the formula:



(a)



(b)

Ar₂ is selected from the group consisting of an unsubstituted or substituted
15 5- or 6-membered heteroaryl ring; unsubstituted or substituted bicyclic heteroaryl
ring; 3,4-(methylenedioxy)phenyl; and phenyl substituted with 0, 1, 2, or 3
substituents in the meta- or para-positions; provided that when Y₁ is O or S, Y₂ is
N, Y₃ is -CR₃ and R₃ is hydrogen, and Y₄ is C, then Ar₂ is not 5-tetrazolyl;
X₁, X₂, X₃, and X₄ are each independently selected from the group
20 consisting of N and -CR₃, provided that R₃ is not hydrogen at least in one
occurrence when X₁, X₂, X₃, and X₄ are all -CR₃;

Y₁, Y₂, and Y₃ are each independently selected from the group consisting of N, O, S, and -CR₃;

Y₄ is C or N, provided that when Y₄ is C at least one of Y₁, Y₂, and Y₃, is other than -CR₃;

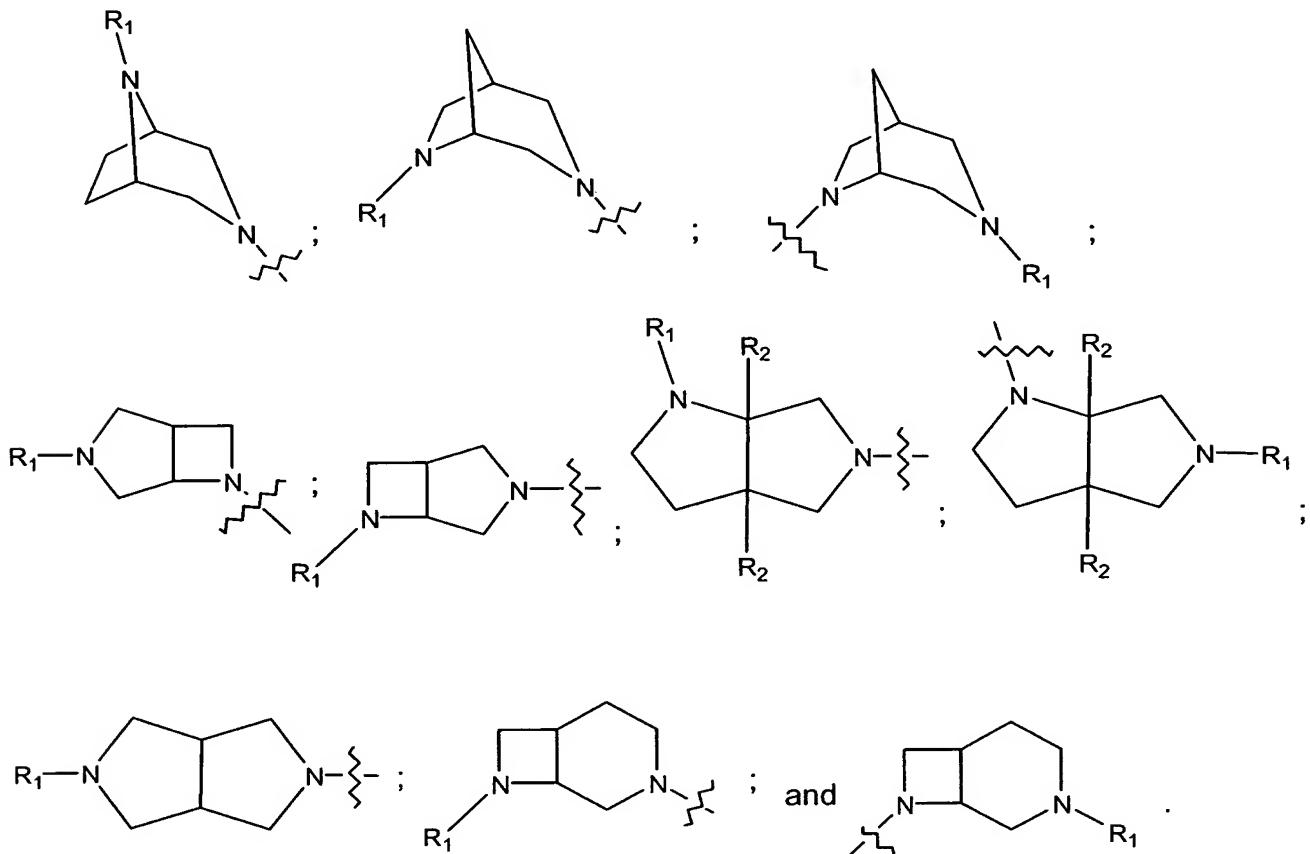
5 *l*, *m*, *n*, *o*, and *p* are each independently selected from 0, 1, or 2, provided that the sum total of *l*, *m*, *n*, *o*, and *p* is 3, 4, or 5;

R₁ is independently selected from the group consisting of hydrogen, alkyl, and alkoxy carbonyl;

10 R₂ at each occurrence is independently selected from the group consisting of hydrogen and alkyl; and

 R₃ at each occurrence is independently selected from the group consisting of hydrogen and alkyl.

2. The compound of claim 1, wherein Z is selected from the group consisting
15 of:

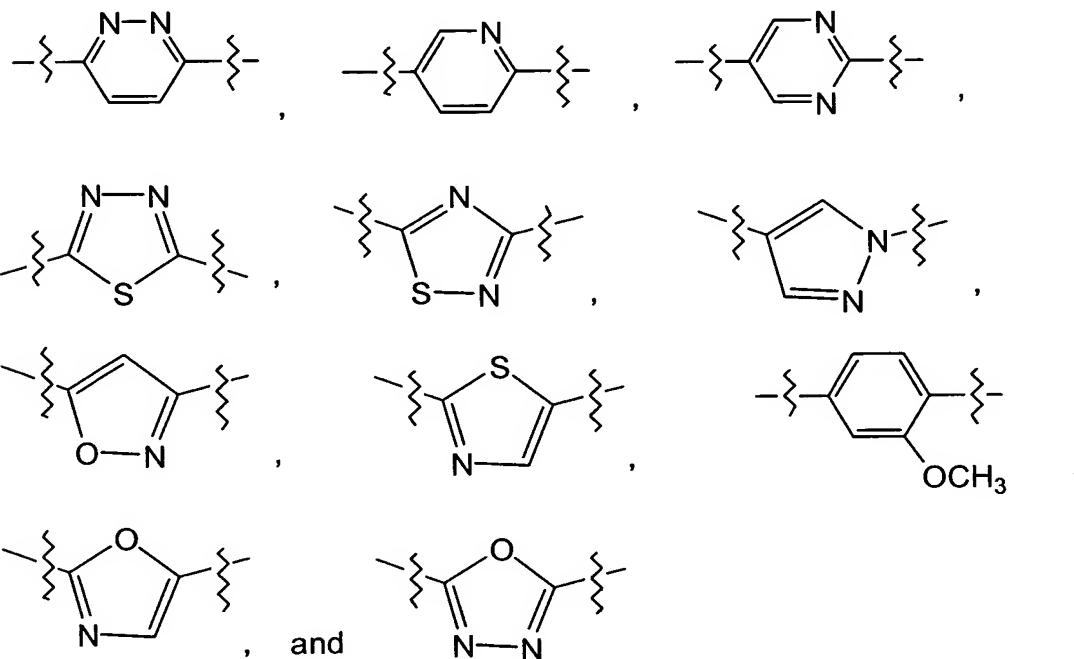


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3. The compound of claim 1, wherein Ar₁ is selected from the group consisting of isoxazolyl, oxadiazolyl, pyrazolyl, pyridazinyl, pyridinyl, pyrimidinyl, thiadiazolyl, thiazolyl, thienyl, and phenyl substituted with 0 or 1 alkoxy substituent.

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4. The compound of claim 1, wherein Ar₁ is selected from the group consisting of:



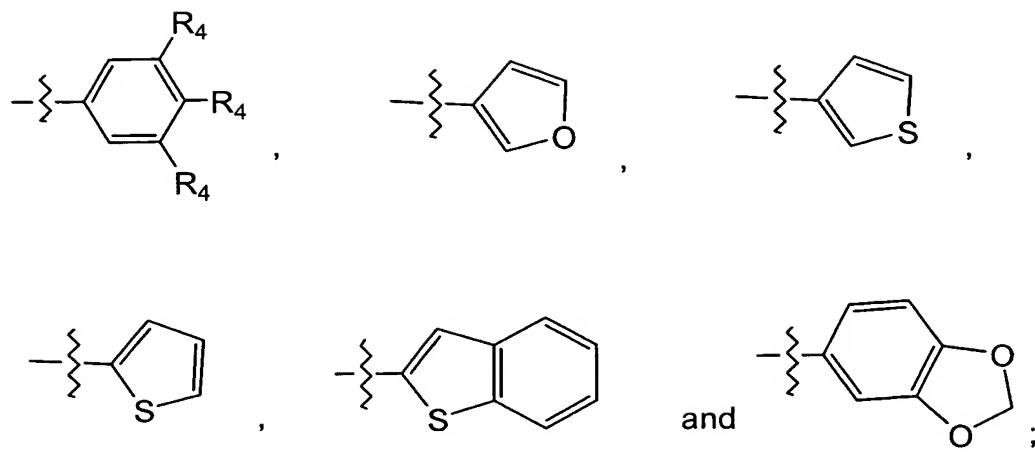
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5. The compound of claim 1, wherein Ar₂ is selected from the group consisting of furyl; thienyl; pyridyl; benzothiophenyl; 3,4-(methylenedioxy)phenyl; and phenyl substituted with 0, 1, or 2 substituents selected from the group consisting of alkoxy, alkoxycarbonyl, alkyl, alkylcarbonyl, carboxy, halogen, haloalkyl, -NR_AR_B, (NR_AR_B)alkyl, (NR_AR_B)alkoxy, and phenyl.

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6. The compound of claim 1, wherein Ar₂ is selected from the group consisting of:

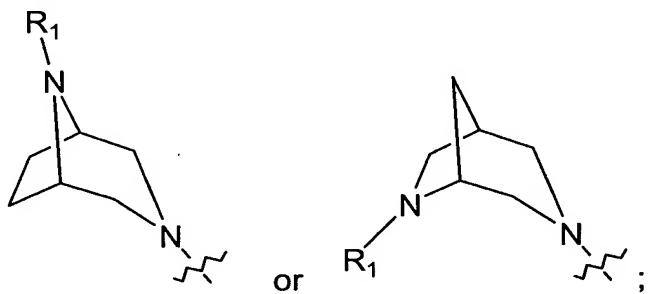


wherein R₄ at each occurrence is independently selected from the group consisting of hydrogen, alkoxy, alkoxycarbonyl, alkyl, alkylcarbonyl, carboxy, halogen, haloalkyl, -NR_AR_B, (NR_AR_B)alkyl, (NR_AR_B)alkoxy, and phenyl.

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7. The compound of claim 6, wherein Ar₂ is selected from the group consisting of phenyl, *m*-methylphenyl, *p*-methoxyphenyl, *m*-trifluoromethylphenyl, and *m*-aminophenyl.

10 8. The compound of claim 1, wherein Z is

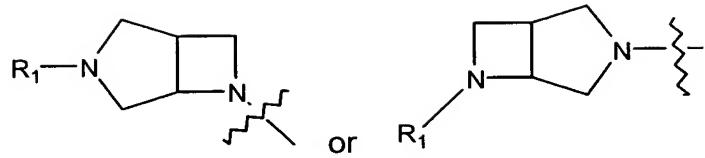


Ar₁ is pyridazinyl; and

Ar₂ is as defined in claim 1.

15 9. The compound of claim 8, wherein Ar₂ is phenyl or phenyl substituted with a substituent selected from the group consisting of alkyl, alkoxy, haloalkyl, -NR_AR_B, and phenyl.

10. The compound of claim 1, wherein Z is



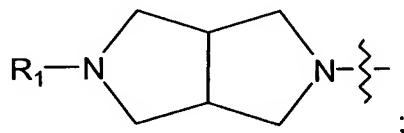
Ar₁ is pyridazinyl or pyridinyl; and

Ar₂ is as defined in claim 1.

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11. The compound of claim 10, wherein Ar₂ is 3,4-(methylenedioxy)phenyl, phenyl, or phenyl substituted with 0, 1, or 2 substituents selected from the group consisting of alkyl and alkylcarbonyl.

10 12. The compound of claim 1, wherein Z is

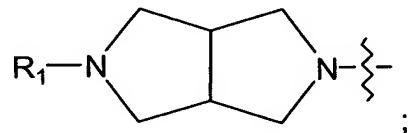


Ar₁ is pyridazinyl; and

Ar₂ is as defined in claim 1.

15 13. The compound of claim 12, wherein Ar₂ is phenyl or phenyl substituted with a substituent selected from the group consisting of alkyl, alkoxy, haloalkyl, -NR_AR_B, and phenyl.

14. The compound of claim 1, wherein Z is



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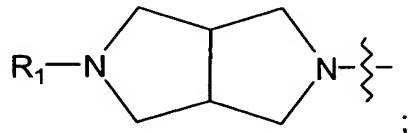
Ar₁ is pyridinyl; and

Ar₂ is defined in claim 1.

25 15. The compound of claim 14, wherein Ar₂ is heteroaryl or bicyclic heteroaryl, provided that Ar₂ is not 1-pyrrolyl or 1-indolyl.

16. The compound of claim 14, wherein Ar₂ is furyl, benzothiophenyl, phenyl, or phenyl substituted with a substituent selected from the group consisting of alkyl, alkoxy, haloalkyl, -NR_AR_B, and phenyl.

5 17. The compound of claim 1, wherein Z is



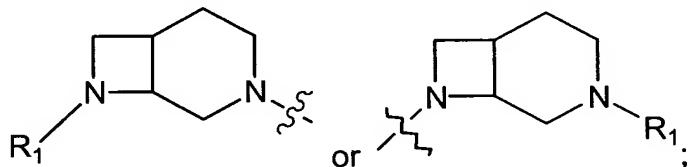
Ar₁ is either isoxazolyl, oxadiazolyl, pyrazolyl, pyrimidinyl, thiadiazolyl, or thiazolyl; and

Ar₂ is as defined in claim 1.

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18. The compound of claim 17, wherein Ar₂ is phenyl or phenyl substituted with a substituent selected from the group consisting of alkyl, alkoxy, haloalkyl, -NR_AR_B, and phenyl.

15 19. The compound of claim 1, wherein Z is



Ar₁ is pyridazinyl, pyrimidinyl, or thiazolyl; and

Ar₂ is as defined in claim 1.

20 20. The compound of claim 19, wherein Ar₂ is phenyl, phenyl substituted with alkylcarbonyl, or 3,4-(methylenedioxy)phenyl.

21. The compound of claim 1, wherein n is 0.

25 22. The compound of claim 1, or a pharmaceutically acceptable salt, ester, amide, or prodrug thereof, selected from the group consisting of:
3-(6-phenyl-pyridazin-3-yl)-3,8-diaza-bicyclo[3.2.1]octane;
8-methyl-3-(6-phenyl-pyridazin-3-yl)-3,8-diaza-bicyclo[3.2.1]octane;

6-methyl-3-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.1]octane;
3-(6-phenyl-pyridazin-3-yl)-3,8-diaza-bicyclo[4.2.0]octane;
8-methyl-3-(6-phenyl-pyridazin-3-yl)-3,8-diaza-bicyclo[4.2.0]octane;
2-(6-phenyl-pyridazin-3-yl)-octahydro-pyrrolo[3,4-c]pyrrole;

5 2-methyl-5-(6-phenyl-pyridazin-3-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-(6-m-tolyl-pyridazin-3-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-methyl-5-(6-m-tolyl-pyridazin-3-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-[6-(4-methoxy-phenyl)-pyridazin-3-yl]-octahydro-pyrrolo[3,4-c]pyrrole;
2-(6-biphenyl-3-yl-pyridin-3-yl)-octahydro-pyrrolo[3,4-c]pyrrole;

10 2-(6-biphenyl-3-yl-pyridin-3-yl)-5-methyl-octahydro-pyrrolo[3,4-c]pyrrole;
2-[6-(3-trifluoromethyl-phenyl)-pyridin-3-yl]-octahydro-pyrrolo[3,4-c]pyrrole;
2-methyl-5-[6-(3-trifluoromethyl-phenyl)-pyridin-3-yl]-octahydro-pyrrolo[3,4-c]pyrrole;
3-[5-(hexahydro-pyrrolo[3,4-c]pyrrol-2-yl)-pyridin-2-yl]-phenylamine;

15 5-(6-furan-3-yl-pyridin-3-yl)-hexahydro-pyrrolo[3,4-c]pyrrole;
2-(6-furan-3-yl-pyridin-3-yl)-5-methyl-octahydro-pyrrolo[3,4-c]pyrrole;
2-(6-benzo[b]thiophen-2-yl-pyridin-3-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-(6-benzo[b]thiophen-2-yl-pyridin-3-yl)-5-methyl-octahydro-pyrrolo[3,4-c]pyrrole;
2-(5-phenyl-pyridin-2-yl)-octahydro-pyrrolo[3,4-c]pyrrole;

20 2-methyl-5-(5-phenyl-pyridin-2-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-(2-phenyl-pyrimidin-5-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-methyl-5-(2-phenyl-pyrimidin-5-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
diethyl-(2-{3-[6-(hexahydro-pyrrolo[3,4-c]pyrrol-2-yl)-pyridazin-3-yl]-phenoxy}-ethyl)-amine;

25 diethyl-(2-{3-[6-(5-methyl-hexahydro-pyrrolo[3,4-c]pyrrol-2-yl)-pyridazin-3-yl]-phenoxy}-ethyl)-amine;
2-(5-phenyl-[1,3,4]thiadiazol-2-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-(3-phenyl-[1,2,4]thiadiazol-5-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-methyl-5-(3-phenyl-[1,2,4]thiadiazol-5-yl)-octahydro-pyrrolo[3,4-c]pyrrole;

30 2-(1-phenyl-1H-pyrazol-4-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-(2-methoxy-biphenyl-4-yl)-octahydro-pyrrolo[3,4-c]pyrrole;
2-(2-methoxy-biphenyl-4-yl)-5-methyl-octahydro-pyrrolo[3,4-c]pyrrole;
2-methyl-5-(3-phenyl-isoxazol-5-yl)-octahydro-pyrrolo[3,4-c]pyrrole;

(1S, 5S)-3-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.0]heptane;
(1S, 5S)-6-methyl-3-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.0]heptane;
(1R, 5S)-6-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.0]heptane;
(1R, 5S)-3-methyl-6-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.0]heptane;
5 (1R, 5R)-3-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.0]heptane;
(1R, 5R)-6-methyl-3-(6-phenyl-pyridazin-3-yl)-3,6-diaza-bicyclo[3.2.0]heptane;
(1R, 5R)-3-(6-benzo[1,3]dioxol-5-yl-pyridazin-3-yl)-3,6-diaza-
bicyclo[3.2.0]heptane;
(1R, 5R)-3-(6-benzo[1,3]dioxol-5-yl-pyridazin-3-yl)-6-methyl-3,6-diaza-
10 bicyclo[3.2.0]heptane;
(1R, 5R)-1-{4-[5-(3,6-diaza-bicyclo[3.2.0]hept-3-yl)-pyridin-2-yl]-phenyl}-
ethanone;
(1R, 5R)-1-{4-[5-(6-methyl-3,6-diaza-bicyclo[3.2.0]hept-3-yl)-pyridin-2-yl]-phenyl}-
ethanone;
15 6a-methyl-5-(6-m-tolyl-pyridin-3-yl)-octahydro-pyrrolo[3,4-b]pyrrole;
2-(5-phenyl-thiazol-2-yl)-octahydro-pyrrolo[3,4-c]pyrrole; and
2-methyl-5-(5-phenyl-thiazol-2-yl)-octahydro-pyrrolo[3,4-c]pyrrole.

23. A pharmaceutical composition comprising a therapeutically effective
20 amount of a compound of claim 1 in combination with a pharmaceutically
acceptable carrier.

24. A method of selectively modulating the effects of α 7 nicotinic acetylcholine
receptors in a mammal comprising administering an effective amount of a
25 compound of claim 1.

25. A method for treating a condition or disorder modulated by an α 7 nicotinic
acetylcholine receptor comprising the step of administering a compound of claim
1.
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26. The method according to claim 25, wherein the condition or disorder is
selected from the group consisting of attention deficit disorder, attention deficit
hyperactivity disorder (ADHD), Alzheimer's disease (AD), mild cognitive

impairment, senile dementia, AIDS dementia, Pick's Disease, dementia associated with Lewy bodies, and dementia associated with Down's syndrome.

27. The method according to claim 25, wherein the condition or disorder is
5 selected from the group consisting of a cognitive disorder, neurodegeneration, and schizophrenia.
28. The method according to claim 25, further comprising administering a compound of claim 1 in combination with an atypical antipsychotic.

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